2.0 SITE DESCRIPTION

The Big Sandy Energy Project is a nominally rated 720-megawatt (MW) combined-cycle power plant located approximately five miles southeast of Wikieup, Arizona. The Wikieup area is in the southeastern portion of Mohave County (**Figure 1**).

The Plant will be located on land privately owned by Caithness. The Plant will be constructed in two phases. Phase 1 will be a 500 MW natural gas-fired combined-cycle power plant comprising two advanced technology combustion turbines, one steam turbine, and supporting equipment. Phase 2 of the Project will consist of a third combustion turbine and steam turbine with one generator in a single shaft combined cycle arrangement resulting in 220MW of additional capacity for a total plant capacity of 720 MW. Phase 2 is expected to be completed within18 months of Phase 1 commercial operation.

Fuel for the plant will be natural gas, delivered to the site via a new pipeline that will interconnect with either or all of three existing gas transmission lines. The plant facilities will cover approximately 76 acres, about 30 acres of which will be occupied by the new generation plant and switchyard. Approximately 18 acres of the site will be used for evaporation ponds. A map of the site configuration is shown in **Figure 2**.

2.1 General Location and Description

General information concerning the plant is provided as follows:

Name of Installation: **Big Sandy Energy Project**
Type of Installation: **Electrical Generation and Distribution Facility**
Sic Code: **5063**
Physical Location of Installation: **Southeast of Wikieup, Arizona**
Telephone Number: **XXX**
Fax Number: **XXX**
Latitude: **34° 40' 28"**
Longitude: **113° 32' 28"**
Name of Owner and Operator: **Caithness Big Sandy Energy, LLC**
Mailing Address of Installation: **XXX**

2.2 General Environment

2.2.1 Topography

The Big Sandy Energy Project is located in the Big Sandy Valley. The Big Sandy Valley is characterized by a mostly undeveloped, desert landscape with sparse vegetation composed mostly of desert scrub. Portions of the valley, however, are irrigated for agricultural crops. A topographic map of the area is provided as **Figure 3**.

2.2.2 Climate

The climate of the Big Sandy Valley is typical of a desert region with minimal precipitation, evaporation greatly exceeding precipitation, hot temperatures with a wide daily temperature range, and low relative humidity.

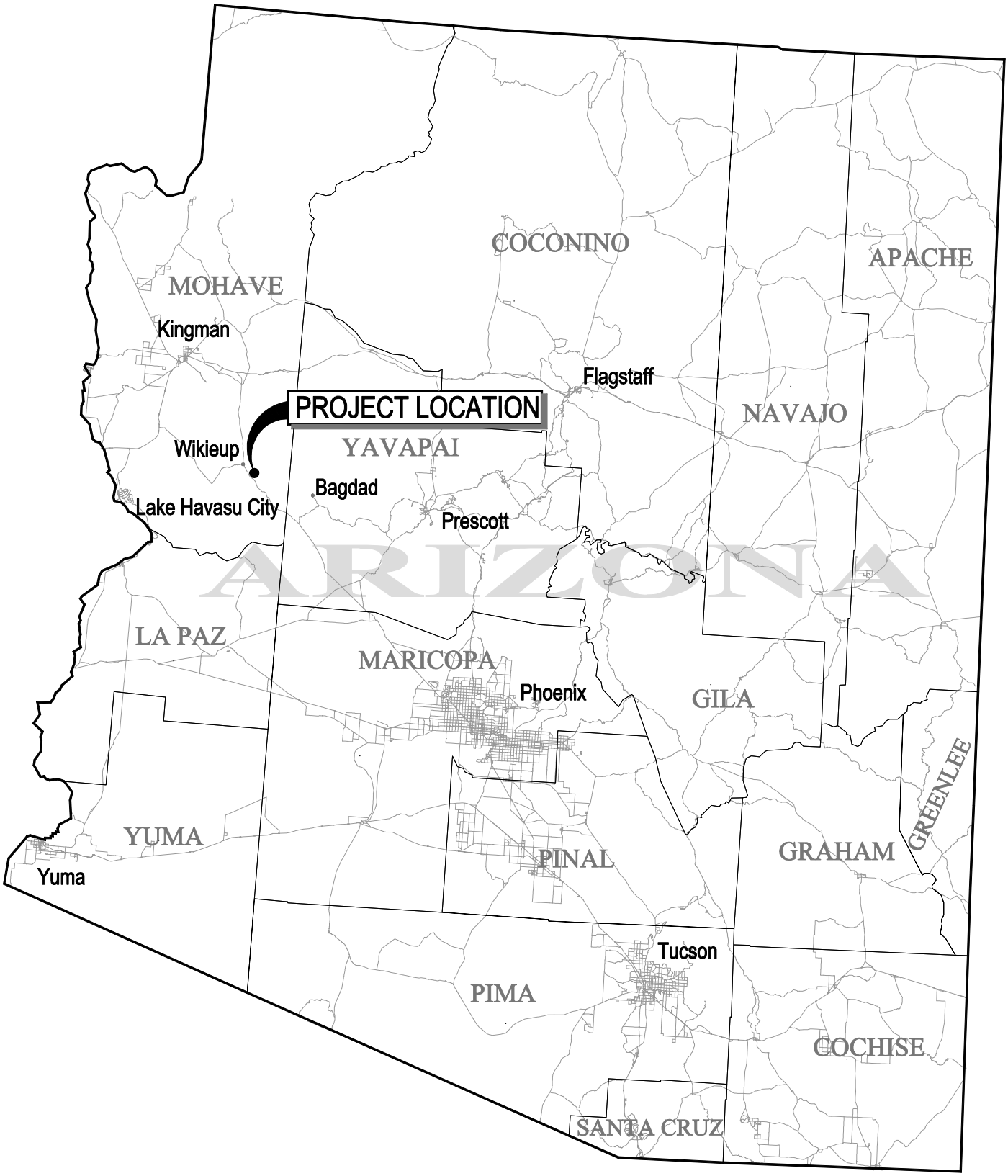
The Big Sandy River Valley lies between the Hualapai Mountains to the west and the Aquarius Mountains to the east. Both of these ranges trend northwest to southeast. The base elevation of the Big Sandy Energy Project will be 2,070 feet. At the project site, the Big Sandy Valley similarly is approximately 7 miles bounded by elevations 2,960 feet to the west and 4,300 feet to the east. The terrain slopes downward from north to south throughout the Big Sandy River Valley.

Wikieup is a cooperative weather reporting location (Station 092309) for the National Weather Service. According to climate records obtained from the Western Regional Climate Center, the average annual temperature at Wikieup is 66.0 °F. The average maximum temperature ranges from 105 °F in July to 64 °F in January. The average minimum temperature ranges from 33 °F in January to 68 °F in July. Precipitation is sparse. The average annual precipitation is only 10 inches. Approximately 47 percent of annual precipitation occurs from December through March. The summer monsoonal flow brings another 32 percent of annual precipitation from July through September. Net pan evaporation at the site is approximately 130 inches per year.

Wind patterns in the area of the project site are presented from data collected at the Wikieup meteorological station, located near the southeast edge of Wikieup. Annual, January to March, April to June, July to September, and October to December wind roses are provided in **Appendix A**.

2.2.3 Runoff Volume and Patterns

As indicated in the previous section, the precipitation in the Wikieup area is concentrated typically in two periods, one in the summer and one in the winter. In



NORTH

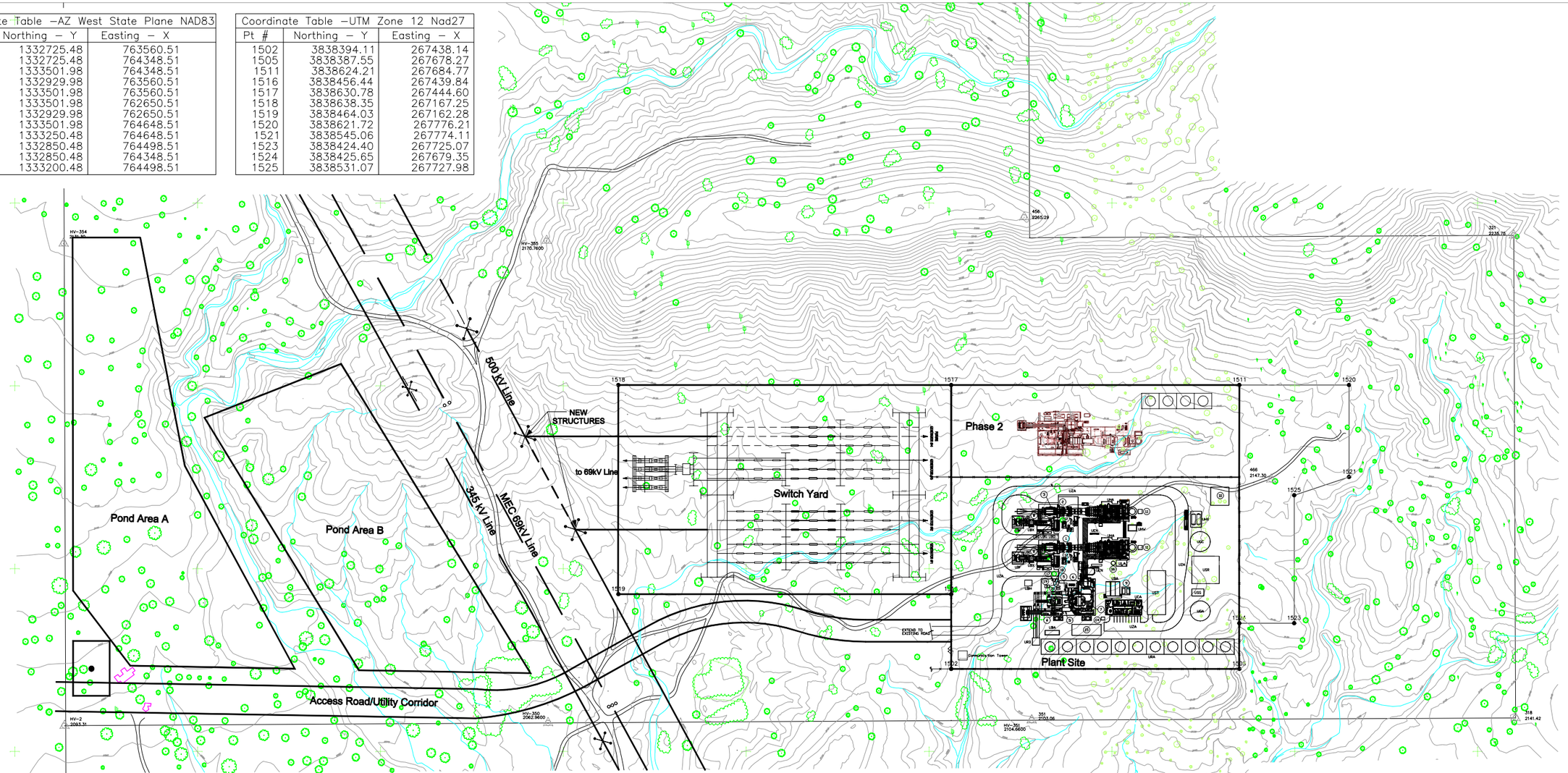
0 50 100

Scale in Miles

APPLICATION FOR A CERTIFICATE OF ENVIRONMENTAL COMPATABILITY	
BIG SANDY ENERGY PROJECT	
FIGURE 1 *PROJECT LOCATION MAP*	
ANALYSIS AREA KINGMAN TO WIKIEUP, MOHAVE COUNTY, ARIZONA	
DATE: 10/11/00	AutoCAD File: 891-LOC.DWG
SCALE: AS NOTED	DRAWN BY: EC

Coordinate Table –AZ West State Plane NAD83		
Pt #	Northing – Y	Easting – X
1502	1332725.48	763560.51
1505	1332725.48	764348.51
1511	1333501.98	764348.51
1516	1332929.98	763560.51
1517	1333501.98	763560.51
1518	1333501.98	762650.51
1519	1332929.98	762650.51
1520	1333501.98	764648.51
1521	1333250.48	764648.51
1523	1332850.48	764498.51
1524	1332850.48	764348.51
1525	1333200.48	764498.51

Coordinate Table –UTM Zone 12 Nad27		
Pt #	Northing – Y	Easting – X
1502	3838394.11	267438.14
1505	3838387.55	267678.27
1511	3838624.21	267684.77
1516	3838456.44	267439.84
1517	3838630.78	267444.60
1518	3838638.35	267167.25
1519	3838464.03	267162.28
1520	3838621.72	267776.21
1521	3838545.06	267774.11
1523	3838424.40	267725.07
1524	3838425.65	267679.35
1525	3838531.07	267727.98



LEGEND

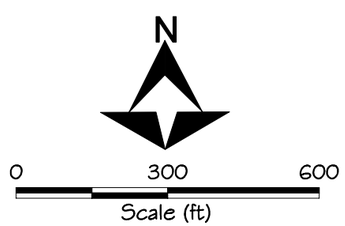
1	GAS TURBINE
2	AIR INTAKE DUCT
3	GENERATOR (TEWAC)
4	STEAM TURBINE
5	CONDENSER
6	MAIN CONDENSATE PUMPS
7	LUBE OIL TANK ROOM
8	GENERATOR BUS DUCT
9	HVAC UNIT FOR UCA
10	FUEL GAS CONDITIONING AREA
11	CEMS ENCLOSURE
12	PLANT AIR COMPRESSORS
13	NOT USED
14	SEPTIC TANK
15	DRAIN FIELD
16	S/U DEAERATOR
17	EXPANSION TANK
18	CLOSED COOLING WATER PUMPS
19	COOLING WATER BOOSTER PUMPS
20	PLATE FRAME HEAT EXCHANGER

UBA	POWER CONTROL CENTER
UBD	LV–AUXILIARY POWER TRANSFORMER
UBE	MV–AUXILIARY POWER TRANSFORMER
UBF	GENERATOR TRANSFORMER
UBG	START UP TRANSFORMERS
UBH	OIL/WATER SEPARATOR
UBX	CIRCUIT BREAKER
UCA	CONTROL ROOM BUILDING
UEN	GAS PREHEATER
UGA	RAW WATER SUPPLY TANK
UGC	DEMINERALIZED WATER STORAGE TANK
UHA	HEAT RECOVERY STEAM GENERATOR
UHW	BOILER BLOWDOWN
UHX	AMMONIA STORAGE AREA
ULA	FEEDWATER PUMPHOUSE
UMY	PIPE BRIDGE
URA	COOLING TOWER
URD	CIRCULATING WATER PUMPS
USG	FIRE PUMP HOUSE
USR	WASTE TREATMENT BUILDING (BY OTHERS)
UST	WORKSHOP
UZA	ROADS

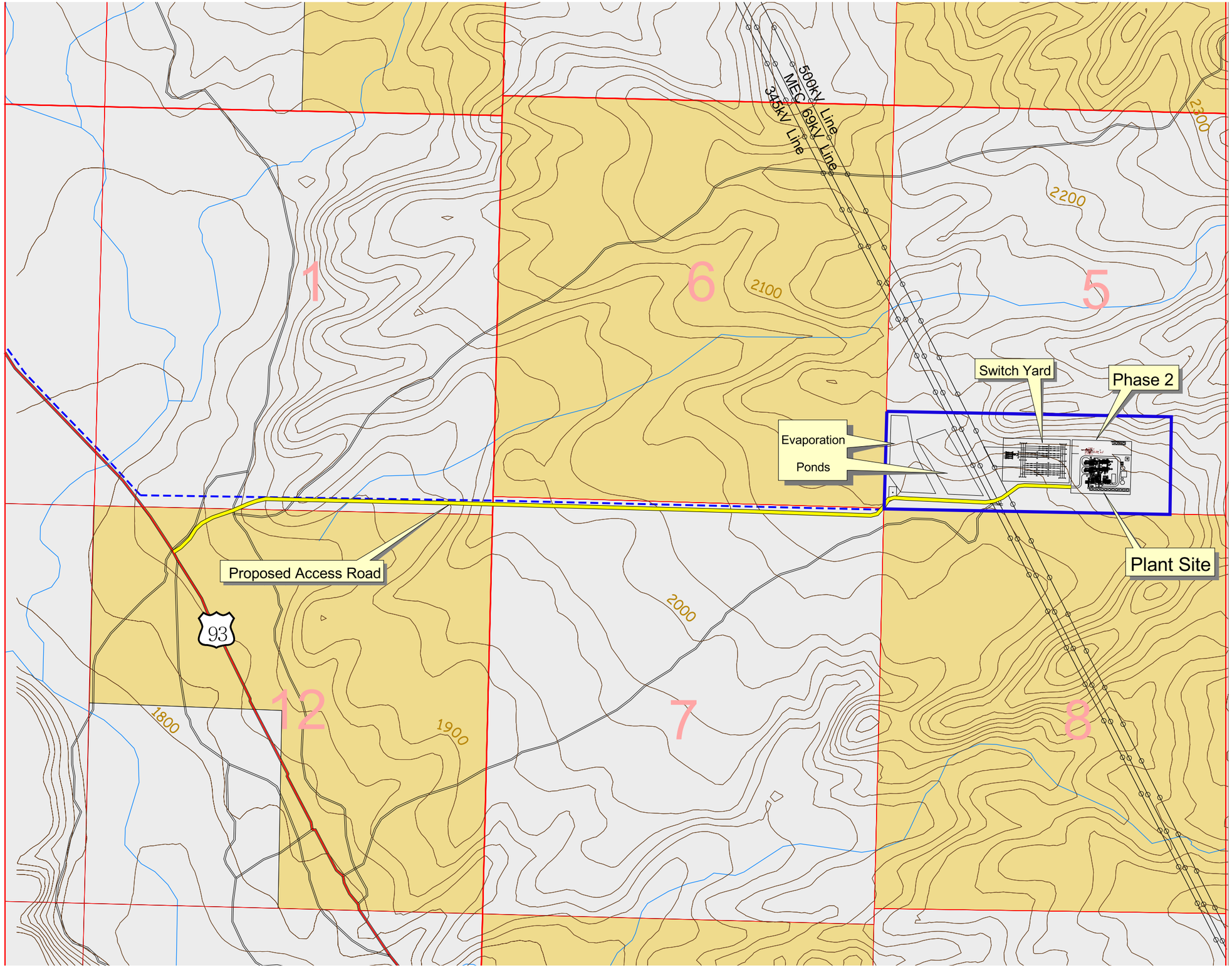
NOTES

1. THE EQUIPMENT SHOWN IS REPRESENTATIVE INFORMATION. THIS DESIGN IS SUBJECT TO CHANGE AT THE DISCRETION OF SIEMENS WESTINGHOUSE.

2. REFERENCE DRAWING G7530102 FOR COMBUSTION TURBINE EQUIPMENT DIMENSIONS AND IDENTIFICATION.



BIG SANDY ENERGY PROJECT
FIGURE 2
Site Configuration



LEGEND

- Proposed Well Locations
- Proposed Access Road
- Proposed Gas Pipeline
- Proposed Water Pipeline
- Primary Trunk Highway
- Light Duty Road
- Existing Transmission Line
- River/Stream

Land Status

- Private Lands
- BLM - Administerd Public Lands

N
W E
S

Scale 1 : 4,600

250 0 250 500 750 Feet

100 0 100 200 Meters

Contour Interval 20 Feet

Transverse Mercator Projection
1927 North American Datum
Zone 12

BIG SANDY ENERGY PROJECT

FIGURE 3
TOPOGRAPHIC MAP OF
BIG SANDY PROJECT AREA

ANALYSIS AREA: MOHAVE CO., CALIFORNIA	
DATE: 12/28/00	ArcView File: F:\BIGSANDY-891\SITE-DIAGRAM.APR
	DRAWN BY: MSH

the summer, high temperatures and moisture from the Gulf of Mexico can result in local thunderstorms. These thunderstorms have high intensities, and can result in heavy local rainfall and rapid runoff. Winter storms are generally the result of storms from the Pacific Ocean and cause gentle rains with little or no runoff. Occasionally, in August or September, moist air from tropical disturbances in the desert combines with Gulf of Mexico moisture and produces heavy rainfall throughout the area.

The power plant site is relatively flat with a slight slope. The general slope of the site is from northeast to the southwest. Some grading will occur at the site. The grading, however, will not significantly alter the current slope or drainage pattern.

Storm water runoff from plant areas will be directed to the evaporation ponds. Storm water runoff at other locations of the Project will be contained in either bermed areas or to local drainage channels.

2.2.4 Geology

Soil types in the Big Sandy Valley within the general area of the facility (**Figure 4**) include the following:

- Cellar-Rock outcrop complex unit is about 50 percent Cellar soil and 25 percent Rock outcrop, somewhat excessively drained, and formed on slopes of 20 to 60 percent. The Cellar parent material is composed of mixed igneous and metamorphic alluvium and colluvium. The soil unit is shallow and very shallow with a moderately rapid permeability. The available water capacity is very low and the shrink-swell potential is low. The potential of water erosion is very severe while the wind erosion potential is very slight. Revegetation in this soil is very difficult due to rock outcrop, low precipitation and water erosion hazard.

- Vekol gravelly loamy sand is a deep, well-drained soil formed on slopes of 2 to 7 percent. The soil is composed of mixed alluvium found at the proximal end of fan terraces. Permeability is slow while runoff is medium. Shrink-swell potential and available water capacity are high. The potential of water erosion is moderate while the hazard of wind erosion is moderately high. Revegetation in this soil is difficult due to low precipitation and wind and water erosion hazard.

- Cave gravelly sandy loam is composed of mixed alluvium found in fan terraces and formed on slopes of 10 to 35 percent. The soil is very shallow and shallow, well-drained with a moderately rapid permeability and a very rapid run-off. The shrink-swell potential is low while the available water capacity is very low. The hazard of water erosion is severe while the hazard

of wind erosion is slight. Revegetation is difficult due to steep slopes, water erosion hazard and low precipitation.

The Project site lies within seismic risk zone 2 (Algermissen 1969). Seismic risk zones are based on the number and intensity of earthquakes over a 100-year period, and are rated on a scale of 0 to 3, with 3 being the highest risk. Moderate damage from an earthquake corresponding to an intensity of 7 on the Modified Mercalli Intensity Scale (intensities are rated on a scale from 1 to 12) is the maximum impact that can be expected within the Project area. A search of the National Earthquake Information Center (USGS NEIC 1999) database was conducted to identify seismic events that have occurred within a 100 km (62 mile) radius of the geographic center of the Project area. From January 1973 through September 1999, two significant earthquakes occurred within the area analyzed. The largest event had a magnitude of 4.6.

Slope failures such as rockfall and slumps can potentially occur on the steep slopes at the northern margin of the site. Flash floods can occur in the washes which drain the site. Other portions of the site will not be susceptible to flooding or slope failure.

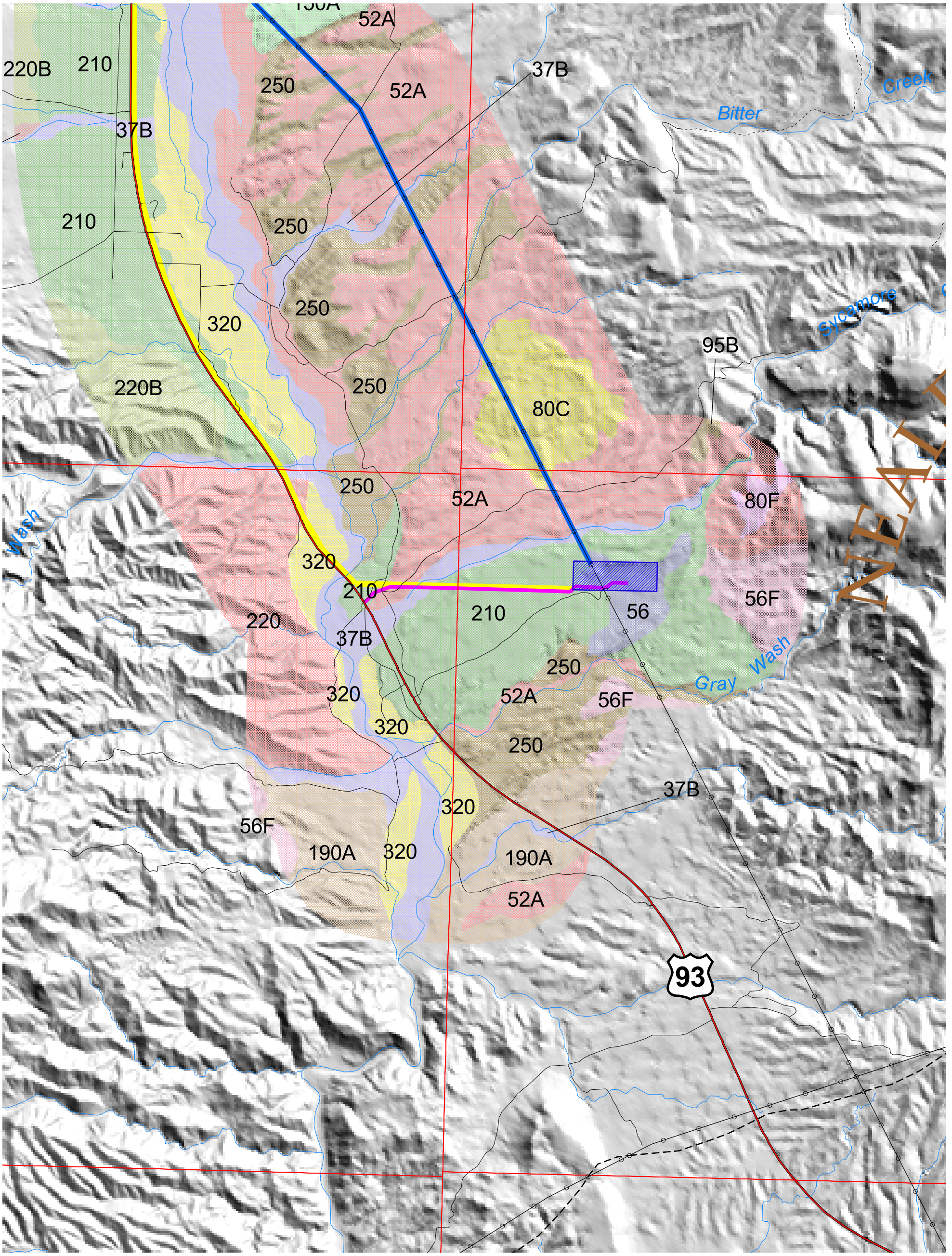
The power plant site is located two miles east of the Big Sandy river bed at elevations ranging from 2060 to 2250 feet. The surface of the site slopes southerly at a 4 to 40 percent gradient. The site is crossed by several ephemeral drainages which are tributaries of Gray Wash, a westerly flowing tributary of the Big Sandy River.

2.2.5 Hydrogeology

The Big Sandy Valley is a graben extending from approximately ten miles south of Wikieup northward to Interstate I-40. The basin in this area is roughly five miles wide at the southern end and widens to ten miles north of Wikieup. The graben extends both south and north beyond these limits, however, the graben becomes shallower and less pronounced to the south and narrower, passing into the Hualapai basin to the north.

The Project site is located in the southeastern portion of the Big Sandy Basin in Township 15N, Range 12W, Section 5. During the tertiary period, the basin was filled with sediments. The lithologic units in the basin are, from youngest to oldest, stream and floodplain alluvium, upper basin fill, lower basin fill, basaltic flows, volcanic rocks of Sycamore Creek, arkosic gravel, arkosic conglomerate, and granitic gneiss.

No surface water bodies or surface flow exist in the vicinity of the plant site, with the exception of ephemeral drainages during extreme storm events that may be evident as surface flow in shallow swales east of the property.



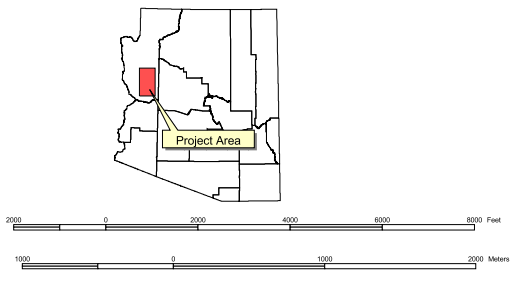
LEGEND

- Primary Trunk Highway
- Secondary Trunk Highway
- Light Duty Road
- Existing Natural Gas Pipelines
- Existing Transmission Lines
- River/Stream
- Proposed Power Plant Site
- Proposed Natural Gas Pipeline Route
- Access Road Corridor

SOIL TYPES

- 150A Continental-Dona Ana complex, dry, 2 to 15 percent slopes
- 190A Stagecoach very gravelly sandy loam, dry, 5 to 35 percent slopes
- 210 Vekol gravelly loamy sand, dry, 2 to 7 percent slopes
- 220 Stagecoach-Topawa-Eba complex, dry, 10 to 50 percent slopes
- 220B Stagecoach-Topawa-Eba complex, 10 to 50 percent slopes
- 250 Torriorthents, dry, 35 to 65 percent slopes
- 320 Gila-Glendale complex, dry, 1 to 3 percent slopes
- 37B Kokan-Vinton-Riverwash complex, dry, 1 to 3 percent slopes
- 52A Cacique extremely gravelly loam, 1 to 7 percent slopes
- 56 Cellar-Rock outcrop complex, dry, 20 to 60 percent slopes
- 56F Cellar-Rock outcrop complex, 20 to 60 percent slopes
- 80C Cline very stony loam, dry, 2 to 15 percent slopes
- 80F Cline very stony loam, dry, 40 to 70 percent slopes
- 95B Alela-Rock outcrop-Rubble land complex, dry, 40-70 percent slopes

Soil coverage compiled from data provided by the BLM Kingman, Arizona.



Transverse Mercator Projection
1927 North American Datum
Zone 12

N

SCALE 1 : 50,000

BIG SANDY ENERGY PROJECT

FIGURE 4
SOIL TYPES
PROPOSED SITE

Analysis Area: Kingman to Wikieup, Mohave County, Arizona

DATE: 9/13/00	ArcView File: F:\BIG SANDY-891\SOIL-SITE.APR
	Produced By: JG

The water level in the Big Sandy Basin varies from surface flow and near surface in the southern portion of the basin near Wikieup to reported depths varying from less than 100 feet to more than 800 feet 36 to 40 miles north of Wikieup near the intersection of Highway I-40 and Highway 93 (Manera, 2000). These variations in the depth to water indicate that there may be both a shallow aquifer and a deep aquifer. The pattern of wells in the basin are shallow wells, in general, less than 300 feet in the southern portions of the basin with the wells increasing in depth as the distance from Wikieup increases.

The Project Area is underlain by several aquifers. The arkosic conglomerate, arkosic gravel, lower basin fill, upper basin fill and stream and flood plain alluvium are the principal units yielding water to wells. In addition to these units a confined basaltic aquifer exists at depth (volcanic rocks of Sycamore Creek), and is the proposed target aquifer for the water supply to the Big Sandy Energy Project. Most wells in the valley are set in either the alluvium or the upper basin fill (Davidson, 1973).

The alluvium is highly permeable and yields of up 1000 gallons per minute (gpm) of water to large diameter wells. Specific capacities of these wells are as high as 130 gpm per foot of drawdown. Aquifer tests in the alluvium near Wikieup indicate that the transmissivity of the alluvium is approximately 250,000 to 300,000 gallons per day per foot (gpd/ft) (Davidson, 1973).

Many of the wells in the alluvium also perforate the upper basin fill. The unit appears to be able to yield up to 1000 gpm of water to wells. Transmissivities of tested wells range from 100,000 to 150,000 gpd/ft (Davidson, 1973).

The gravel and sand beds in the lower basin fill appear to be of moderate permeability. Wells that obtain water from the lower basin fill yield from 1 to 18 gpm per foot of drawdown. In some areas the unit does not appear to provide sufficient water to wells (Davidson, 1973).

The arkosic gravel has wells that penetrate this unit in the northern portion of the valley. Specific capacities of these wells is up to 10 gpm per foot of drawdown. No wells penetrate this unit in the southern portion of the valley; however, the unit probably exists at depth (Davidson, 1973). Confirmation of these assumptions of the lithology are found in the drilling report by Lease.

The volcanic rocks of Sycamore Creek are a confined highly productive aquifer. Pump testing and exploration have been performed as part of a groundwater exploration program. The results of this program are detailed in the "Groundwater Resources of the Southern Big Sandy Valley" (Manera, 2000).

Groundwater quality in the valley is described by Davidson (1973) as having a total dissolved solids concentration of 350 to 800 mg/l with the concentrations increasing to the south. The maximum dissolved solids concentrations reported are 2540 mg/l. Water samples were obtained from the exploratory borings performed for the project. TDS concentrations for the volcanic aquifer ranged from 770 mg/l to 900 mg/l.

2.2.6 Land Use

The proposed Plant site is located about 45 miles southeast of Kingman, AZ and about four miles southeast of Wikieup, AZ in Mohave County. The Plant site will be located on private land owned by Caithness. Access to the Plant site from U.S. Highway 93 will be provided by a County access road. BLM-administered lands will be crossed at one section corner, and a right-of-way grant from the BLM will be required. Land ownership in the general Plant site area consists of a checkerboard pattern of private and federal lands.

The Plant site will be located on an undeveloped parcel of land owned by Caithness. The 120-acre site is currently zoned for Industrial Use. Portions of the lands surrounding the Plant site that are owned by Caithness will still be available for agricultural use or maintained in their natural state.

Future and planned land uses in the Plant site and vicinity are within the Rural Development Area (RDA) type defined in the Mohave County General Plan. Detailed land use classes in the RDA type include rural residential, rural industrial, public parks, public lands, and non-residential uses such as neighborhood commercial, commercial recreation, light industrial, heavy industrial, and airport industrial. The site and surrounding rural area is mostly undeveloped.

A BLM-designated right-of-way utility corridor identified in the *Kingman Resource Area Resource Management Plan (RMP) and Final Environmental Impact Statement* (BLM, 1993) crosses the southwestern portion of the Plant site. This mile-wide corridor is called the "Mead to Phoenix utility corridor." Under the RMP, large utility facilities on federal lands are restricted to these corridors; their use minimizes surface disturbance to otherwise undisturbed areas.

Public utility and infrastructure facilities are necessary elements in the development of urban, suburban, and rural land uses. The proposed Project is compatible with the future land use planning areas of rural development. As can be seen from the description of rural development areas presented earlier, a wide variety of land uses are allowed in this type of area, including light industrial and heavy industrial. Therefore, construction and operation of an electrical power plant will be fully compatible with Mohave County land use planning.

2.3 Maps of Facility Layout

The current proposed design of the storm water system for the Project calls for all storm water runoff in the main plant area to be diverted to the two lined evaporation ponds for disposal by evaporation. All chemicals used at the plant are stored in this main plant area.

Storm water outside of the main plant will flow by gravity and natural drainage to evaporation ponds located west of the switchyard. Water collected in this area will be naturally evaporated. Other areas outside of the main plant area not drained into the evaporation ponds will be to natural drainage channels. A proposed layout of the facility is included on **Figure 2**.

Storm water channels, manholes, drainage pipes, and out-falls for the plant will be supplied to the ADEQ after completion of the design phase of the project. As built drawings of the storm water system will be supplied to the ADEQ, prior to start-up of the facility.